PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s):	John K. Walton et al.	
Serial No.:	Not Yet Assigned	Group Art Unit: Not Yet Assigned
Filed:	Herewith	Examiner: Not Yet Assigned
Entitled:	DATA STORAGE SYSTEM	
Docket No	: EMC2-078AUS	

Certificate of Express Mailing

"Express Mail" mailing label number: ET806886545US
Date of Deposit: January 22, 2002

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January 22, 2002
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PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231
ATTN: Box Patent Application

Please amend the above-identified application as follows.

In The Specification

After the Title, please insert:

--RELATED PATENT APPLICATIONS

This is a divisional of patent application no. 09/223,519 filed December 30, 1998.--

In The Claims

Please Cancel Claims 1-10 and add the following new claims:

11. A data storage system wherein end-user data is transferred between a host computer and a bank of disk drives through an interface, such interface, comprising:

a memory;

a plurality of directors, at least one front-end one of the directors being in communication with the host computer and at least one rear-end one of the directors being in communication with the bank of disk drives, each one of the directirs comprising:

a central processing unit;

an interface state data bus section, for carrying interface state data, such interface state data bus section being in communication with: both the at least one front-end one and the at least one rear-end one of the directors; and the memory;

a plurality of end-user data busses, for carrying end-user data, each one of the plurality of end-user data busses having a first end coupled to a corresponding one of the plurality of directors and a second end coupled to the memory; and

wherein the central processing units of such plurality of directors control the end-user data transfer between the host computer and the bank of disk drives through the memory via the end-user data busses in response to interface state data generated by the

directors, such generated interface state data being transferred among the directors through the memory via the interface state data bus section.

12. The system recited in claim 11 wherein the end-users data busses are serial busses.

13. The system recited in claim 11 wherein the interface state data bus section includes parallel busses.

14. The system recited in claim 13 wherein the parallel busses are coupled to the directors in a multi-drop configuration.

15. The system recited in claim 13 wherein the end-user data busses are serial busses.

16. The system recited in claim 15 wherein the parallel busses are coupled to the directors in a multi-drop configuration.

17. The system recited in claim 11 including a coupling node and wherein each the memory has a plurality of regions and wherein the each one of the end-user data buses is coupled to the plurality of regions selectively through coupling node.

18. The system recited in claim 17 wherein the coupling node includes a cross-bar switch.

19. The system recited in claim 13 wherein the interface state data bus section includes a plurality of parallel busses, each one thereof being coupled to a one of the plurality of directors and to the memory.

20. A method of operating a data storage system wherein end-user data is transferred between a host computer and a bank of disk drives through an interface, such method comprising:

providing a memory;

providing a plurality of directors, each one of the directors having a central processing unit, at least one front-end one of the directors being in communication with the host computer and at least one rear-end one of the directors being in communication with the bank of disk drives;

providing a plurality of interface state data busses for carrying interface state data, such interface state data busses being in communication with: both the at least one front-end one and the at least one rear-end one of the directors; and the memory;

providing a plurality of end-user data busses, for carrying end-user data, each one of the plurality of end-user data busses having a first end coupled to a corresponding one of the plurality of directors and a second end coupled to the memory; and

wherein the central processing units of such plurality of directors control the end-user data transfer between the host computer and the bank of disk drives through the memory via the end-user data busses in response to interface state data generated by the directors, such generated interface state data being transferred among the directors through the memory via the interface state data bus.

21. A data storage system wherein end-user data is transferred between a host computer and a bank of disk drives through an interface, such interface, comprising:

a memory;

a plurality of directors, each one having a central processing unit, at least one front-end one of the directors being in communication with the host computer and at least one rear-end one of the directors being in communication with the bank of disk drives;

an interface state data bus section, for carrying interface state data, such interface state data bus section being in communication with the at least one front-end one and the at least one rear-end one of the directors;

a plurality of end-user data busses, for carrying end-user data, each one of the plurality of end-user data busses having a first end coupled to a corresponding one of the plurality of directors and a second end coupled to the memory; and

wherein such central processing units of the plurality of directors control the end-user data transfer between the host computer and the bank of disk drives through the memory via the end-user data busses in response to interface state data generated by the directors, such generated interface state data being transferred among the directors via the interface state data bus section.

22. The system recited in claim 21 wherein the end-users data busses are serial busses.

23. The system recited in claim 21 wherein the interface state data bus section includes parallel busses.

24. The system recited in claim 23 wherein the parallel busses are coupled to the directors in a multi-drop configuration.

25. The system recited in claim 23 wherein the end-user data busses are serial busses.

26. The system recited in claim 25 wherein the parallel busses are coupled to the directors in a multi-drop configuration.

27. The system recited in claim 21 including a coupling node and wherein each the memory has a plurality of regions and wherein the each one of the end-user data buses is coupled to the plurality of regions selectively through coupling node.

28. The system recited in claim 23 wherein the interface state data bus section includes a plurality of parallel busses, each one thereof being coupled to a one of the plurality of directors and to the memory.

29. A method of operating a data storage system wherein end-user data is transferred between a host computer and a bank of disk drives through an interface, such method comprising:

providing a memory;

providing a plurality of directors each one of the directors having a central processing unit, at least one front-end one of the directors being in communication with

the host computer and at least one rear-end one of the directors being in communication with the bank of disk drives;

providing an interface state data section for carrying interface state data, such interface state data section being in communication with the at least one front-end one and the at least one rear-end one of the directors;

providing a plurality of end-user data busses, for carrying end-user data, each one of the plurality of end-user data busses having a first end coupled to a corresponding one of the plurality of directors and a second end coupled to the memory; and

wherein such central processing units of the plurality of directors control the end-user data transfer between the host computer and the bank of disk drives and the memory via the end-user data busses in response to interface state data generated by the directors, such generated interface state data being transferred among the directors via the interface state data section.

30 A data storage system wherein end-user data is transferred between a host computer and a bank of disk drives through an interface, such interface, comprising:

a memory;

a plurality of directors, each one thereof having a central processing unit, a front-end portion of such plurality of directors being in communication with the host computer, and a rear end portion of such plurality of directors being in communication with the bank of disk drives;

an interface state data bus section, for carrying interface state data, such interface state data bus section being in communication with both the front-end portion of the plurality of directors and the rear end portion of the plurality of directors;

a plurality of end-user data busses, for carrying end-user data, each one of the plurality of end-user data busses having a first end coupled to a corresponding one of the plurality of directors and a second end coupled to the memory; and

wherein the central processing units of such plurality of directors control the end-user data transfer between the host computer and the bank of disk drives through the memory via the end-user data busses in response to interface state data generated by the directors, such generated interface state data being transferred among the directors via the interface state data bus section.

31. The system recited in claim 30 wherein the end-users data busses are serial busses.

32. The system recited in claim 30 wherein the interface state data bus section includes parallel busses.

33. The system recited in claim 32 wherein the parallel busses are coupled to the directors in a multi-drop configuration.

34. The system recited in claim 32 wherein the end-user data busses are serial busses.

35. The system recited in claim 34 wherein the parallel busses are coupled to the directors in a multi-drop configuration.

36. The system recited in claim 30 including a coupling node and wherein each the memory has a plurality of regions and wherein the each one of the end-user data buses is coupled to the plurality of regions selectively through coupling node.

37. The system recited in claim 36 wherein the coupling node includes a cross-bar switch.

38. The system recited in claim 32 wherein the interface state data bus section includes a plurality of parallel busses, each one thereof being coupled to a one of the plurality of directors and to the memory.

39. A method of operating a data storage system wherein end-user data is transferred between a host computer and a bank of disk drives through an interface, such method comprising:

providing a memory;

providing a plurality of directors, each one of the directors having a central processing unit, a front end portion of the directors being in communication with the host computer and a rear end portion of the directors being in communication with the bank of disk drives;

providing an interface state data section for carrying interface state data, such interface state data section being in communication with the front end portion of the directors and the rear end portion of the directors;

providing a plurality of end-user data busses, for carrying end-user data, each one of the plurality of end-user data busses having a first end coupled to a corresponding one of the plurality of directors and a second end coupled to the memory; and

wherein the central processing units of such plurality of directors control the end-user data transfer between the host computer and the bank of disk drives and the memory via the end-user data busses in response to interface state data generated by the directors, such generated interface state data being transferred among the directors via the interface state data section.

40. A data storage system wherein end-user data is transferred between a host computer and a bank of disk drives through an interface, such interface, comprising:

a memory;

a plurality of directors, comprising:

a plurality of front-end directors, each one of such front-end direcytors having a central processing unit, such plurality of front end directors being in communication with the host computer, and

a plurality of rear end directors, each one of the rear-end directors having a central processing unit, such plurality of rear end directors being in communication with the bank of disk drives;

an interface state data bus section, for carrying interface state data, such interface state data bus section being in communication with both the front-end portion of the plurality of directors and the rear end portion of the plurality of directors;

a plurality of end-user data busses, for carrying end-user data, each one of a first portion of the plurality of end-user data busses having a first end coupled to a corresponding one of the plurality of front end directors and a second end coupled to the memory and each one of a second portion of the plurality of end user data buses having a first end coupled to a corresponding one of the plurality of rear end directors and a second end coupled to the memory; and

wherein the central processing units of such plurality of directors control the end-user data transfer between the host computer and the bank of disk drives through the memory via the end-user data busses in response to interface state data generated by the directors, such generated interface state data being transferred among the directors via the interface state data bus section.

41. The system recited in claim 40 wherein the first portion of the end-users data busses comprises a plurality of serial busses.

42. The system recited in claim 40 wherein the second portion of the interface state data bus section comprises a plurality of serial busses.

43. The system recited in claim 42 wherein the first portion of the end-users data busses comprises a plurality of serial busses.

44. A method of operating a data storage system wherein end-user data is transferred between a host computer and a bank of disk drives through an interface, such method comprising:

providing a memory;

providing a plurality of directors, such plurality of directors comprising:

a plurality of front end directors, each one thereof having a central processing unit, such plurality of front end directors being in communication with the host computer, and;

a plurality of rear end directors, each one thereof having a central processing unit, such plurality of rear end directors being in communication with the bank of disk drives;

providing an interface state data section for carrying interface state data, such interface state data section being in communication with the plurality of front end directors and the plurality of rear end directors;

providing a plurality of end-user data busses, for carrying end-user data, each one of a first portion of the plurality of end-user data busses having a first end coupled to a corresponding one of the plurality of front end directors and a second end coupled to the memory and each one of a second portion of the plurality of end user buses having a first end coupled to a corresponding one of the plurality of the rear end directors and a second end coupled to the memory;

wherein the central processing units of such plurality of directors control the end-user data transfer between the host computer and the bank of disk drives and the memory via the end-user data busses in response to interface state data generated by the

directors, such generated interface state data being transferred among the directors via the interface state data section.

45. The method recited in claim 44 wherein the first portion of the end-users data busses is provided with a plurality of serial busses.

46. The method recited in claim 44 wherein the second portion of the interface state data bus section is provided with a plurality of serial busses.

47. The method recited in claim 46 wherein the first portion of the end-users data busses is provided with a plurality of serial busses.

The Assistant Commissioner is hereby authorized to charge payment of any additional fees associated with this communication or credit any overpayment to Deposit Account No. 50-0845.

Respectfully submitted,

1/22/02
Date

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